BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20554

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	

Comments of Sony Electronics Inc.

Sony Electronics Inc. ("Sony")[1] respectfully submits the following comments on the Notice of Proposed Rulemaking in the above-referenced proceeding.[2] Sony supports the Commission's proposal to allow unlicensed devices to operate in the 6 GHz band under the Commission's Part 15 rules, and encourages the Commission to move quickly to open this valuable spectrum for broader use.

Sony supports the Commission's proposed framework for unlicensed wireless operations in the 5.925-6.425 GHz (U-NII-5) and 6.525-6.875 GHz (U-NII-7) bands, which would prohibit co-channel transmissions within the defined exclusion zone of any incumbent fixed link. The Commission should consider, however, defining this exclusion zone in three dimensions rather than two, to increase spectral efficiency in environments where fixed links transmit from significant antenna height. Sony also supports the Commission's proposal to implement an automated frequency coordination ("AFC") mechanism for unlicensed operations in the U-NII-5

[1] Sony Electronics is the U.S.-based sales, marketing, research, and development subsidiary of Sony Corporation, a leading manufacturer of audio, video, game, communications, and information technology products for the consumer and professional markets. Sony entities design, manufacture, and sell mobile products throughout the world, and have conducted extensive research and testing of next-generation wireless services. These comments supersede and replace the December 7, 2018 filing in this docket submitted by Sony Electronics North American Region Product Compliance.

[2] *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295, Notice of Proposed Rulemaking, FCC 18-147 (Oct. 24, 2018) ("NPRM").

and U-NII-7 bands, whereby an access point would receive a list of permissible operating frequencies and would allow transmission only on those permitted frequencies.[3]

In addition, Sony encourages the Commission to consider authorizing two classes of access points for the U-NII-5 and U-NII-7 bands: (1) a standard-power access point as defined in the NPRM;[4] and (2) a low-power access point that would operate under the control of an AFC system, but at the power limits specified in the NPRM for U-NII-6 and U-NII-8 band low-power access points.[5] Low-power access points in the U-NII-5 and U-NII-7 bands would benefit from a more generous exclusion zone than standard-power access points, thereby increasing spectrum utilization while maintaining the necessary protections for incumbent services.

Determining Permissible Frequencies of Operation

Sony agrees that access points should be required to obtain a list of available frequencies from an AFC system before commencing radio transmissions in the U-NII-5 and U-NII-7 bands. The AFC system should perform the following functions:

i. Determine and provide to an access point, upon request, available frequencies at the access point's geolocation in the 6 GHz bands;

ii. Determine and provide to an access point, upon request, the maximum permitted transmit power corresponding to each available frequency at the access point's geolocation;

iii. Receive and validate the operational frequency and transmit power provided by an access point for a given geolocation;

iv. Register the identification information and geolocation of access points;

v. Allow and respond to an aggregated request sent by intermediate entity on behalf of

[3] Sony has received conditional approval to serve as a spectrum access system ("SAS") administrator for wireless operations in the 3.5 GHz band. *See Wireless Telecommunications Bureau and Office of Engineering and Technology Conditionally Approve Seven Spectrum Access System Administrators for the 3.5 GHz Band*, Public Notice, 31 FCC Rcd 13355 (2016).

[4] 1 watt, with a maximum power spectral density of 17 dBm in any 1 megahertz band.

[5] 250 milliwatts, with a maximum power spectral density of 11 dBm in any 1 megahertz band.

one or more access points;

vi. Retain information on and enforce exclusion zones;

vii. Ensure that access points operate in geographic areas and within the maximum acceptable power levels required to protect incumbent systems from harmful interference;

viii. Ensure secure and reliable transmission of information between the AFC system and the access points which operate in the U-NII 5 and 7 bands;

ix. Implement the terms of international agreements as they relate to the use of 6 GHz bands;

x. Receive reports of interference and requests for additional protection from incumbent users and promptly address interference issues.

Sony supports a centralized model where all data are located and computations occur in a central location or the cloud, rather than distributed among access points. A centralized model will minimize the cost, complexity, and resource demands of access points and client devices, thereby encouraging market adoption. It would also facilitate the calculation of aggregate interference, if necessary to protect fixed service stations. Moreover, a centralized architecture would relieve access points of the burden of employing the strong security measures necessary to ensure the confidentiality of operational parameters and user information. Although a centralized model may require a more complex software implementation, much of the system design can be adapted from existing spectrum management database technologies such as those implemented for TV white spaces and 3.5 GHz services.

Whether an AFC system can be a "simple database that is easy to implement"[6] will depend on the features that the system must support. If the Commission holds AFC systems responsible for incumbent protection, operators may need to implement functionality that

[6] NRPM at ¶ 21.

increases system complexity, such as access point registration, aggregate interference calculation, and synchronization among multiple AFC systems. All or a part of these features have already been implemented in other contexts, and would therefore not require significant additional engineering resources to support in an AFC system. New features, however, may require substantial engineering effort.

Determining Available Frequencies

The AFC system should determine frequency availability at power levels less than the maximum, and then calculate a list of available frequencies and the maximum power permitted on each one. To ensure maximum spectral efficiency and to maintain neutrality among air-interface technologies, the AFC system should report the range or ranges of available frequencies rather than the availability of discrete frequency bands.[7] After receiving the list of available frequencies, an access point should be required to provide its intended operating frequencies and associated maximum transmission power levels back to the managing AFC system. The system would then verify that those operational parameters do not cause harmful interference to incumbent systems, and could maintain the information in a band in-use database to assist with identifying the source of any interference that does occur. Because the AFC system cannot guarantee that an access point will follow its assigned parameters, the Commission should require access point manufacturers to attest to compliance as a part of equipment authorization. Finally, to allow an AFC system to determine available operating frequencies accurately, the Commission should require the incumbent users to regularly maintain the accuracy and

[7] Having the AFC list the range or ranges of unavailable frequencies, and requiring a conversion into a list of available frequencies, would impose an unnecessary burden on access points, adding complexity and cost.

completeness of the data recorded in the ULS, and should provide license holders a simple mechanism for doing so.

Device registration

Sony encourages the Commission to implement a registration requirement, whereby an access point would be required to provide certain information and operational parameters to an AFC system before receiving a list of permitted frequencies. Such a requirement is necessary in order to facilitate the identification and remediation of harmful interference to incumbent licensees, and would help ensure secure communication between access points and the AFC system. Although mandatory access point registration will add a minor amount of complexity to the AFC system, much of the technology necessary for implementing such a system has already been developed for use in the 3.5 GHz band. The following parameters should be provided by an access point to the AFC system:

- FCC ID;
- Manufacturer's unique serial number;
- Geographic coordinates;
- Geolocation accuracy;
- Antenna height above ground level;
- Antenna information (including antenna gain, directionality, beam direction);
- Indoor/Outdoor location;
- Device Class (standard- or low-power);
- Maximum EIRP;
- Air interface technology

To ensure the accurate entry of operational parameters into the AFC system, the Commission should require professional installation of all access points that operate in the U-NII-5 and U-NII-7 bands. Professional installation would facilitate verification of these parameters and the accuracy of the access point geolocation. Although no mechanism exists for the AFC system to verify this parameters independently, the Wireless Innovation Forum has

developed a Certified Professional Installer ("CPI") accreditation standard,[8] which requires that a CPI assume responsibility for the accurate entry of the required information, and which could be applied for use in the 6 GHz ecosystem.

In addition to the technical data described above, access points should report contact information for the device operator, and for the professional installer or CPI, to the AFC system. In some scenarios, such as a hardware malfunction, the AFC system may not be able to resolve interference without human intervention. Having this contact information readily available will facilitate and expedite interference resolution in these situations.

Updating frequency availability information

Sony agrees with the Commission's proposal to adopt a requirement that access points periodically verify whether frequency availability has changed. To do so, the Commission should adopt a general performance rule rather than specify a particular re-verification mechanism, which should be left to industry to develop. Assuming that the AFC system identifies available frequencies using data from the Commission's Universal Licensing System, the maximum update interval should match the update interval of that Commission database. However, if the Commission elects to authorize multiple AFC systems and to require synchronization among those systems, the update interval should also account for that synchronization interval. In a situation where communications break down and a device cannot perform an automatic update with the AFC system, the device should be allowed to continue to operate for a certain period of time, after which it must cease operations until it can reestablish contact with the AFC system and verify the list of available frequencies. In addition to periodic verification of frequency

[8] WINNF-TS-0247-V1.1.0 "CBRS Certified Professional Installer Accreditation Technical Specification," Wireless Innovation Forum, 23 January 2019.

availability, the Commission should mandate either re-registration or an update to the existing registration when the physical location of an access point changes. The Commission should not impose a "push notification" requirement, as it would add significant and unnecessary complexity to the AFC system.

Security Requirements

Sony recommends that the Commission adopt security requirements that are similar to those already specified in Part 15 Subpart H for white spaces devices and in Part 96 for CBRS. Specifically, access points and the AFC system should be required to incorporate security measures to ensure that access points communicate only with authorized AFC systems, that all communications and interactions between an AFC system and access points are accurate and secure, and that unauthorized parties cannot access or alter an AFC system or the list of available frequencies sent to an access point. The AFC system should also be required to verify that the FCC ID provided by an access point is for a certified device and should refuse to provide service to an uncertified device. In addition, all unlicensed devices operating in the 6 GHz band should be required to contain security features sufficient to protect against unauthorized modification of software and firmware.

AFC System Operators

Sony encourages the Commission to allow the greatest possible variety of AFC business models, and accordingly should designate multiple entities to operate AFC systems. Access points do not need to interoperate with all AFC systems, and an AFC operator should be permitted to serve only the access points and devices that it produces. At the same time, the Commission should encourage system robustness and redundancy by allowing devices to register with multiple AFC systems concurrently. To facilitate AFC standardization and certification,

and to avoid uncertainty about responsibility for incumbent protection, the Commission should require all functions of a single AFC system to be performed by a single entity. Communication and synchronization among systems may be necessary if AFC systems are required to implement incumbent protection based on aggregate interference, or if temporary fixed operations and stations operating under conditional authority register their operational parameters directly to an AFC system rather than through the Commission's ULS. Sony agrees that AFC system operators should serve a five-year term, and should provide a minimum of 30 days' notice and transfer registration data to another operator if discontinuing service before the end of that term.

AFC System Certification

To allow for the development and evolution of AFC system operator business models, the Commission should adopt separate testing and certification requirements for AFC systems, access points, and devices. This model has worked for SAS and CBSD testing in the 3.5 GHz context, and should be sufficient to ensure basic interoperability between AFC systems and access points.

Client Devices

Sony agrees with the Commission's proposal to require client devices that operate in the U-NII-5 and U-NII-7 bands to be under the control of an access point. To ensure that client devices operate only at non-interfering locations, Sony agrees with the Commission's proposal to specify an area of operation centered on the location of the access point. One way to define this area of operation would be through the use of "generic operational parameters" as specified in ETSI EN 301 598.[9] Client devices should be permitted to transmit probe requests, provided that

[9] ETSI EN 301 598 V2.1.1 (2018-01) White Space Devices (WSD); Wireless Access Systems operating in the 470 MHz to 790 MHz TV broadcast band; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

they can detect and decode an authorization signal broadcast by an access point. This requirement would ensure that client devices avoid transmitting probe requests in an area where no access points have been authorized by the AFC system. An access point would broadcast the "generic operational parameters" as a part of an authorization signal. The Commission should clarify that its proposed definition of "client device" applies only to devices operating in the 6 GHz band, and not to U-NII devices operating in the 5 GHz band, which may implement wireless peer-to-peer applications such as Wi-Fi Direct.

Mobile and Transportable Operation

Sony encourages the Commission to allow unlicensed devices in the U-NII-5 and U-NII-7 bands to operate as mobile hotspots and transportable devices, and believes that operation under the control of an AFC system is technically feasible.

Unwanted Emissions Limits

The Commission should specify out-of-band emissions limits between the sub-bands of the 6 GHz band. Such limits are necessary in order to guarantee protection of in-band incumbents from adjacent channel interference.

Interference Resolution Process

Sony believes that it is necessary to institute an interference resolution process beyond the Commission's existing rules for unlicensed devices. AFC system operators should coordinate to develop this process, and should be responsible for exercising it.

Informational Requirements

To prevent harmful interference, the Commission should require manufacturers to provide consumers with information on any specific operational requirements applicable to

devices operating in the U-NII-5 through U-NII-8 bands. Information on any specific operational requirements should be conveyed by device labeling or in the user's manual.

Respectfully Submitted,

/s/

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